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15 February 2023

Report No : GEO/37345/01

Page 1 of 1

For the attention of Ms H Nickless

Our ref **GEO / 37345**
Your Ref **404.V09695.00001**

Date samples received 24/01/2023
Date written instructions received 01/02/2023
Date testing commenced 02/02/2023
Date of sample disposal 15/03/2023

Project **WHITBROOK / HANSON STREET**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	~	Liquid & Plastic Limits Summary
~	9	Water Content
2	3	Liquid & Plastic Limits
3	~	Geochemical Test Summary
~	9	BRE SD1 Suite A - Natural ground
~	2	Organic Matter Content
4	9	Particle Size Distribution
5	~	Unconfined Compressive Strength Summary
6	2	Unconfined Compressive Strength

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
on behalf of **GEOLABS Limited**



J A Reynolds
Director

SUMMARY OF LIQUID AND PLASTIC LIMIT TESTS

Location	Depth m	Sample Ref	Sample Type	Description	Water Content BS EN ISO 17892-1 : 2014 %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Percentage Passing 425µm %	Atterberg Classification	Test Type	Sample Condition
BH01	0.60-0.80		B	Brownish grey mottled white clayey sandy SILT with much fine to coarse gravel and single cobble.	32.0	~	~	~	~	~	~	~
BH01	1.50-2.20		B	Dark grey and dark brown mottled slightly clayey silty SAND with much fine to coarse gravel.	53.8	~	~	~	~	~	~	~
BH01	2.20-2.70		B	Black slightly clayey silty very sandy fine to coarse GRAVEL.	57.0	~	~	~	~	~	~	~
BH01	3.03-3.12		D	Dark brown clayey silty SAND with rare fine to medium gravel.	26.3	~	NP		81	~	3	3
BH01	5.20-6.70		B	Brown slightly clayey silty SAND.	21.4	~	~	~	~	~	~	~
BH02	1.50-1.60		D	Structureless CHALK composed of cream and dark grey mottled sandy gravelly SILT. Gravel is medium density.	50.6	~	NP		96	~	3	3
BH02	2.80-2.90		D	Structureless CHALK composed of light grey sandy gravelly SILT. Gravel is medium density.	69.9	~	NP		86	~	3	3
BH02	4.20-4.67		B	Dark grey and brown mottled clayey silty SAND with rare fine to medium gravel.	21.2	~	~	~	~	~	~	~
BH02	4.67-6.20		B	Greyish brown mottled dark grey slightly clayey SAND with much fine to coarse gravel and two cobbles.	18.0	~	~	~	~	~	~	~

Test Type:

1 - 1 point 80g / 30° fall cone method.
 2 - 4 point 80g / 30° fall cone method.
 3 - Non plastic determination.

Sample condition:

1 - As Received
 2 - Air Dried
 3 - Washed & Air Dried

Checked and Approved by:



J A Reynolds - Director
 15/02/2023

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LIQUID AND PLASTIC LIMITS

Location BH01
Depth (m) 3.03
Sample Type D

Description:

Dark brown clayey silty SAND with rare fine to medium gravel.

Preparation : Particles >425µm removed by wet sieving and air drying.

Water Content : (BS EN ISO 17892-1:2014) 26.3 %

Measured percentage passing 425µm sieve : 81 %

Liquid Limit - Fall Cone Method (cone angle 30°) : Not Determined

Plastic Limit : Non-Plastic

Equivalent Water Content of material passing 425µm sieve : 32 %

Sample was determined to be Non-Plastic after preparation

Tested by AD
Checked and Approved by



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LIQUID AND PLASTIC LIMITS

Location BH02
Depth (m) 1.50
Sample Type D

Description:

Structureless CHALK composed of cream and dark grey mottled sandy gravelly SILT. Gravel is medium density.

Preparation : Particles >425µm removed by wet sieving and air drying.

Water Content : (BS EN ISO 17892-1:2014) 50.6 %

Measured percentage passing 425µm sieve : 96 %

Liquid Limit - Fall Cone Method (cone angle 30°) : Not Determined

Plastic Limit : Non-Plastic

Equivalent Water Content of material passing 425µm sieve : 53 %

Sample was determined to be Non-Plastic after preparation

Tested by AD
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LIQUID AND PLASTIC LIMITS

Location BH02
Depth (m) 2.80
Sample Type D

Description:

Structureless CHALK composed of light grey sandy gravelly SILT. Gravel is medium density.

Preparation : Particles >425µm removed by wet sieving and air drying.

Water Content : (BS EN ISO 17892-1:2014) 69.9 %

Measured percentage passing 425µm sieve : 86 %

Liquid Limit - Fall Cone Method (cone angle 30°) : Not Determined

Plastic Limit : Non-Plastic

Equivalent Water Content of material passing 425µm sieve : 81 %

Sample was determined to be Non-Plastic after preparation

Tested by AD
Checked and Approved by



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SUMMARY OF CHEMICAL TESTS ON SOIL

Location	Depth m	Sample Ref	Sample Type	pH Value	Total Acid Soluble Sulphate as SO ₄ %	Water Soluble Sulphate as SO ₄ 2:1 Water:Soil Extract g/l	Total Sulphur %	Water Soluble Chloride g/l	Water Soluble Nitrate g/l	Magnesium g/l	Organic Content %	Mass Loss on Ignition %	Carbonate Content %
BH01	0.60-0.80		B	9.1	-	0.81	-	-	-	-	-	-	-
BH01	1.50-2.20		B	8.4	-	0.34	-	-	-	-	-	-	-
BH01	2.20-2.70		B	8.7	-	0.87	-	-	-	-	-	-	-
BH01	3.03-3.12		D	8.3	-	0.58	-	-	-	-	4.3	-	-
BH01	5.20-6.70		B	8.7	-	0.062	-	-	-	-	< 0.40	-	-
BH02	1.50-1.60		D	9.0	-	< 0.010	-	-	-	-	-	-	-
BH02	2.80-2.90		D	9.3	-	0.75	-	-	-	-	-	-	-
BH02	4.20-4.67		B	8.5	-	0.38	-	-	-	-	-	-	-
BH02	4.67-6.20		B	8.7	-	0.18	-	-	-	-	-	-	-

Tested by Chemtest Ltd : MCERTS / UKAS No 2183

Checked and Approved by:


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PARTICLE SIZE DISTRIBUTION

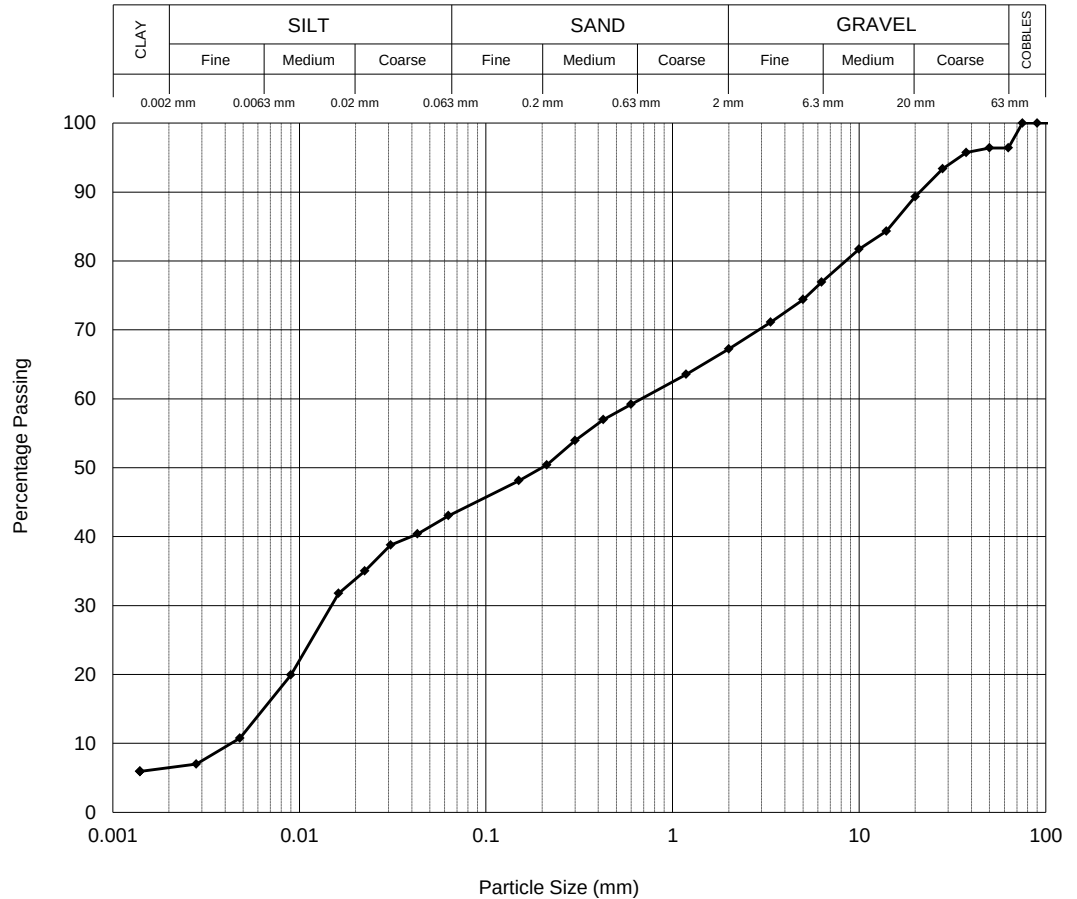
Location BH01
Depth (m) 0.60-0.80
Sample Type B

Description

Brownish grey mottled white clayey sandy SILT with much fine to coarse gravel and single cobble.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	96
50.0 mm	96
37.5 mm	96
28.0 mm	93
20.0 mm	89
14.0 mm	84
10.0 mm	82
6.30 mm	77
5.00 mm	74
3.35 mm	71
2.00 mm	67
1.18 mm	64
600 µm	59
425 µm	57
300 µm	54
212 µm	50
150 µm	48
63 µm	43



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
43 µm	40
31 µm	39
22 µm	35
16 µm	32
9.0 µm	20
4.8 µm	11
2.8 µm	7
1.4 µm	6

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	3.6
Gravel	29.2
Sand	24.2
Silt	36.7
Clay	6.3

Tested by PK
Checked and Approved by

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PARTICLE SIZE DISTRIBUTION

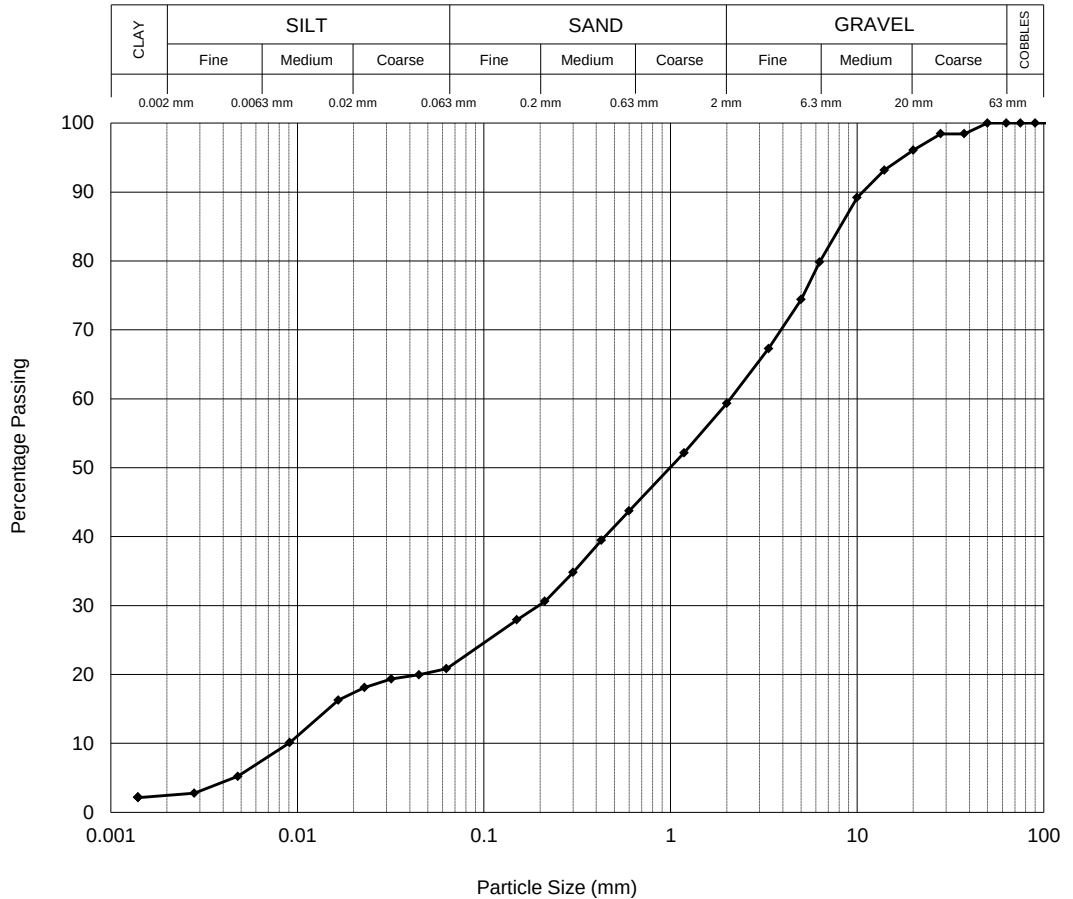
Location BH01
Depth (m) 1.50-2.20
Sample Type B

Description

Dark grey and dark brown mottled slightly clayey silty SAND with much fine to coarse gravel.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	98
28.0 mm	98
20.0 mm	96
14.0 mm	93
10.0 mm	89
6.30 mm	80
5.00 mm	74
3.35 mm	67
2.00 mm	59
1.18 mm	52
600 µm	44
425 µm	39
300 µm	35
212 µm	31
150 µm	28
63 µm	21



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
45 µm	20
32 µm	19
23 µm	18
17 µm	16
9.1 µm	10
4.8 µm	5
2.8 µm	3
1.4 µm	2

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	40.6
Sand	38.5
Silt	18.4
Clay	2.5

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PARTICLE SIZE DISTRIBUTION

Location
Depth (m)
Sample Type

BH01
2.20-2.70
B

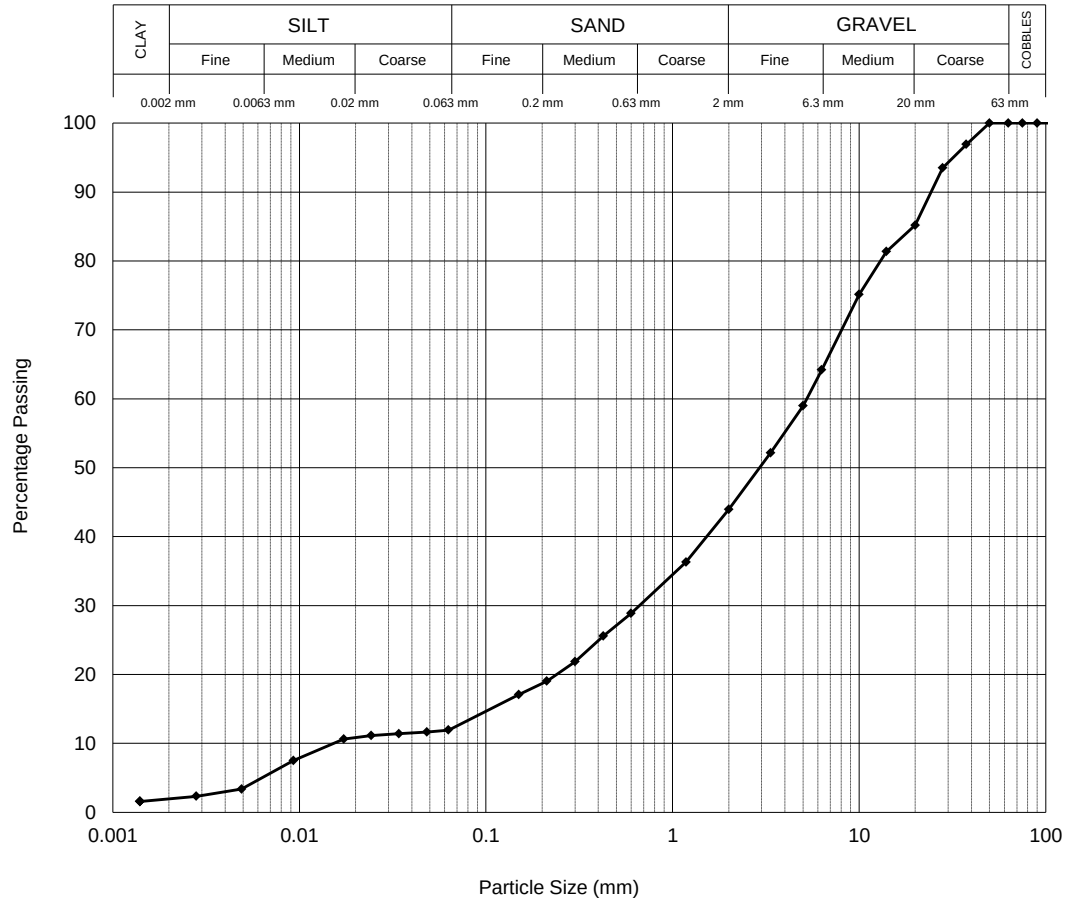
Description

Black slightly clayey silty very sandy fine to coarse GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	97
28.0 mm	94
20.0 mm	85
14.0 mm	81
10.0 mm	75
6.30 mm	64
5.00 mm	59
3.35 mm	52
2.00 mm	44
1.18 mm	36
600 µm	29
425 µm	26
300 µm	22
212 µm	19
150 µm	17
63 µm	12



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
48 µm	12
34 µm	11
24 µm	11
17 µm	11
9.3 µm	8
4.9 µm	3
2.8 µm	2
1.4 µm	2

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	56.0
Sand	32.0
Silt	10.0
Clay	2.0

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BS EN ISO 17892-4 : 2016

PARTICLE SIZE DISTRIBUTION

Location
Depth (m)
Sample Type

BH01
3.03-3.12
D

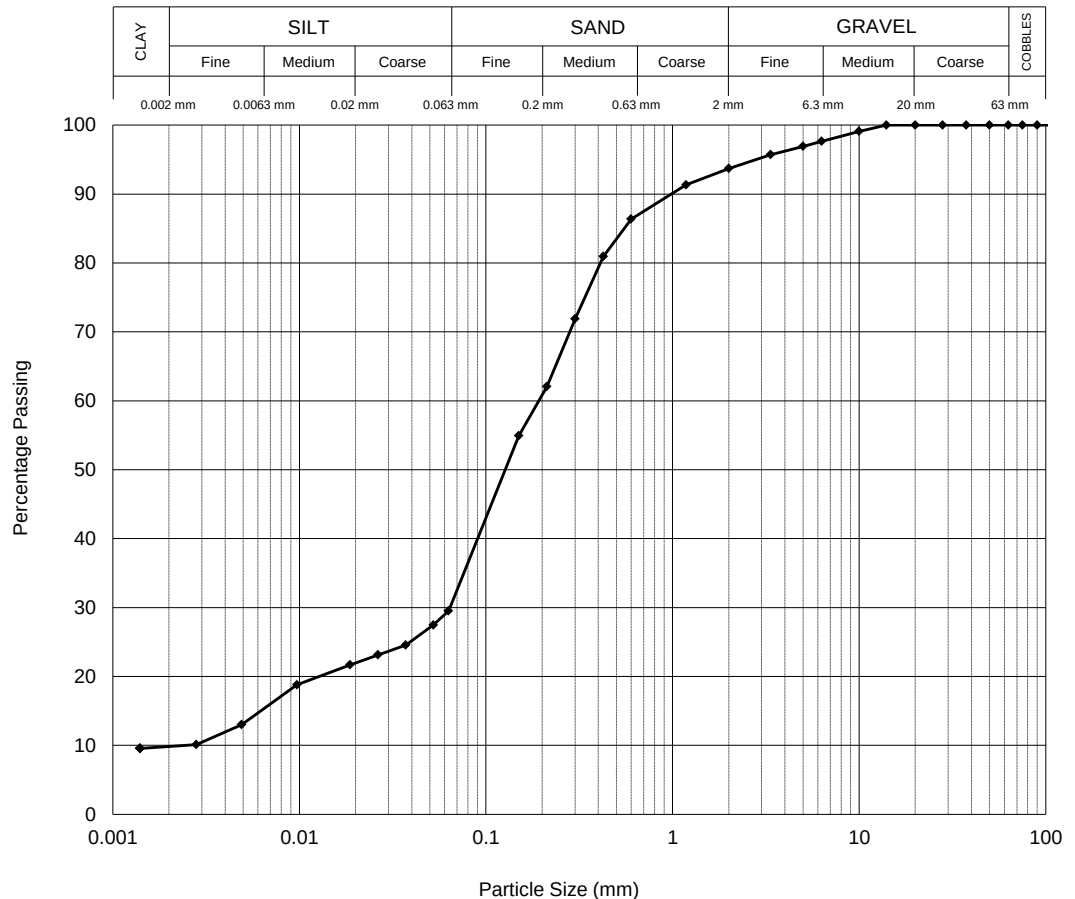
Description

Dark brown clayey silty SAND with rare fine to medium gravel.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	99
6.30 mm	98
5.00 mm	97
3.35 mm	96
2.00 mm	94
1.18 mm	91
600 µm	86
425 µm	81
300 µm	72
212 µm	62
150 µm	55
63 µm	30



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
52 µm	27
37 µm	25
26 µm	23
19 µm	22
9.7 µm	19
4.9 µm	13
2.8 µm	10
1.4 µm	10
Particle Density 2.70(A) Mg/m³	

Particle Proportions	
Cobbles	0.0
Gravel	6.3
Sand	64.2
Silt	19.7
Clay	9.8

Tested by PK
Checked and Approved by

J A Rogers

J A Reynolds - Director
15/02/2023

Project Number:

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PARTICLE SIZE DISTRIBUTION

Location
Depth (m)
Sample Type

BH01
5.20-6.70
B

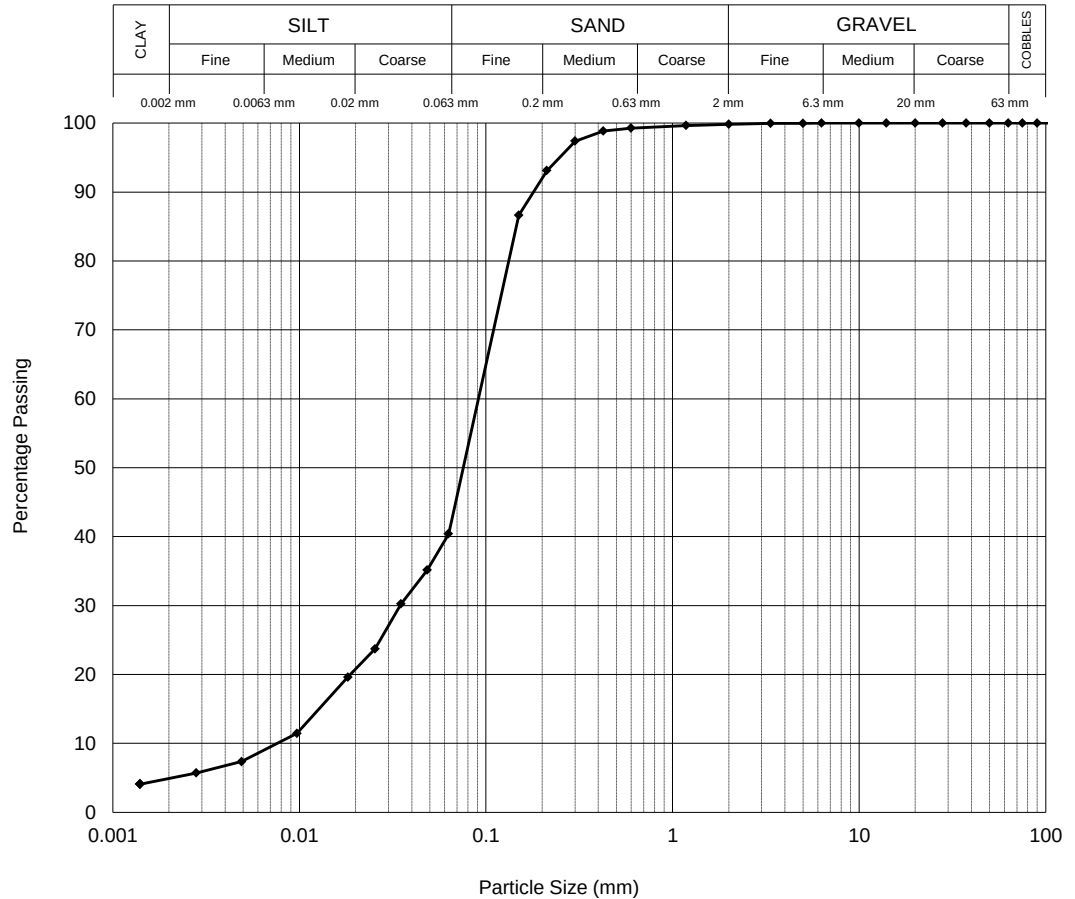
Description

Brown slightly clayey silty SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	99
425 µm	99
300 µm	97
212 µm	93
150 µm	87
63 µm	40



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
49 µm	35
35 µm	30
25 µm	24
18 µm	20
9.7 µm	11
4.9 µm	7
2.8 µm	6
1.4 µm	4

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	0.2
Sand	59.4
Silt	35.6
Clay	4.8

Tested by PK
Checked and Approved by

J A Reynolds

J A Reynolds - Director
15/02/2023

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PARTICLE SIZE DISTRIBUTION

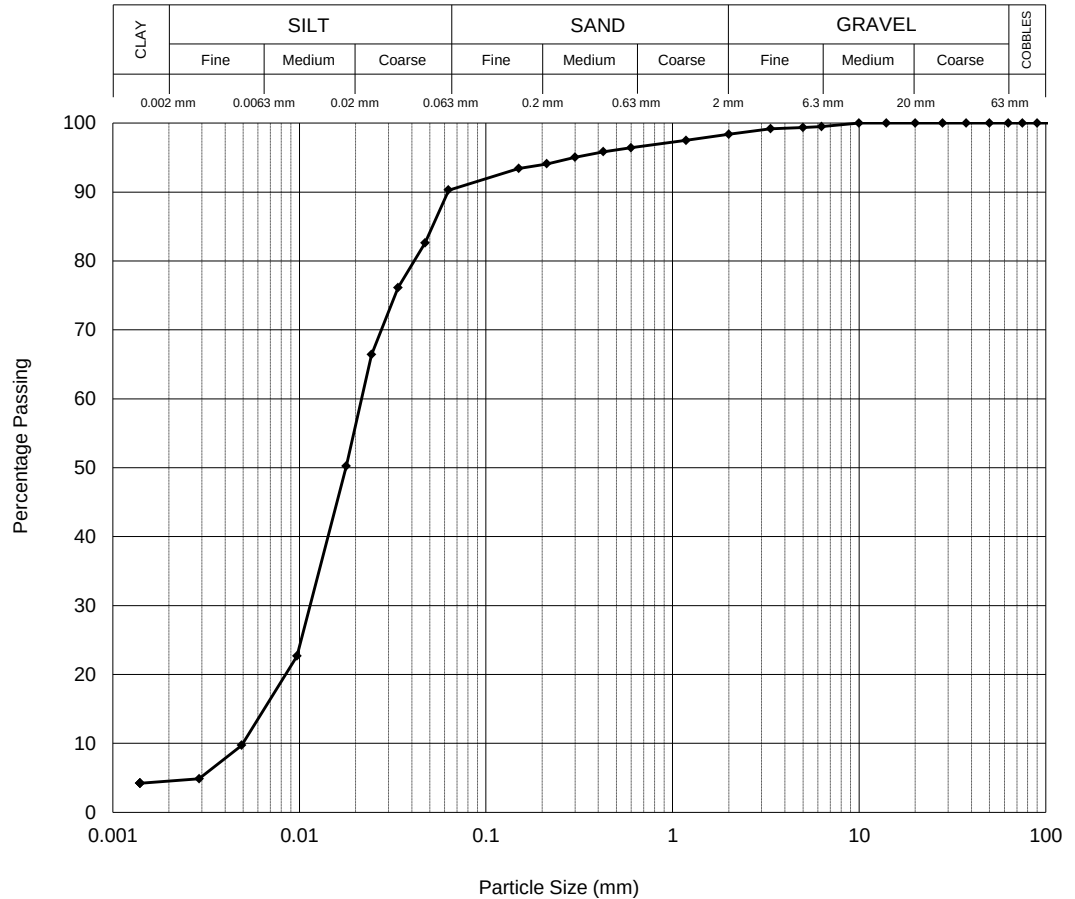
Location BH02
 Depth (m) 1.50-1.60
 Sample Type D

Description

Structureless CHALK composed of cream and dark grey mottled sandy gravelly SILT. Gravel is medium density.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
 BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	99
3.35 mm	99
2.00 mm	98
1.18 mm	97
600 µm	96
425 µm	96
300 µm	95
212 µm	94
150 µm	93
63 µm	90



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
47 µm	83
34 µm	76
24 µm	66
18 µm	50
9.7 µm	23
4.9 µm	10
2.9 µm	5
1.4 µm	4

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	1.6
Sand	8.1
Silt	85.8
Clay	4.5

Tested by PK
 Checked and Approved by

J A Reynolds

J A Reynolds - Director
 15/02/2023

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PARTICLE SIZE DISTRIBUTION

Location
Depth (m)
Sample Type

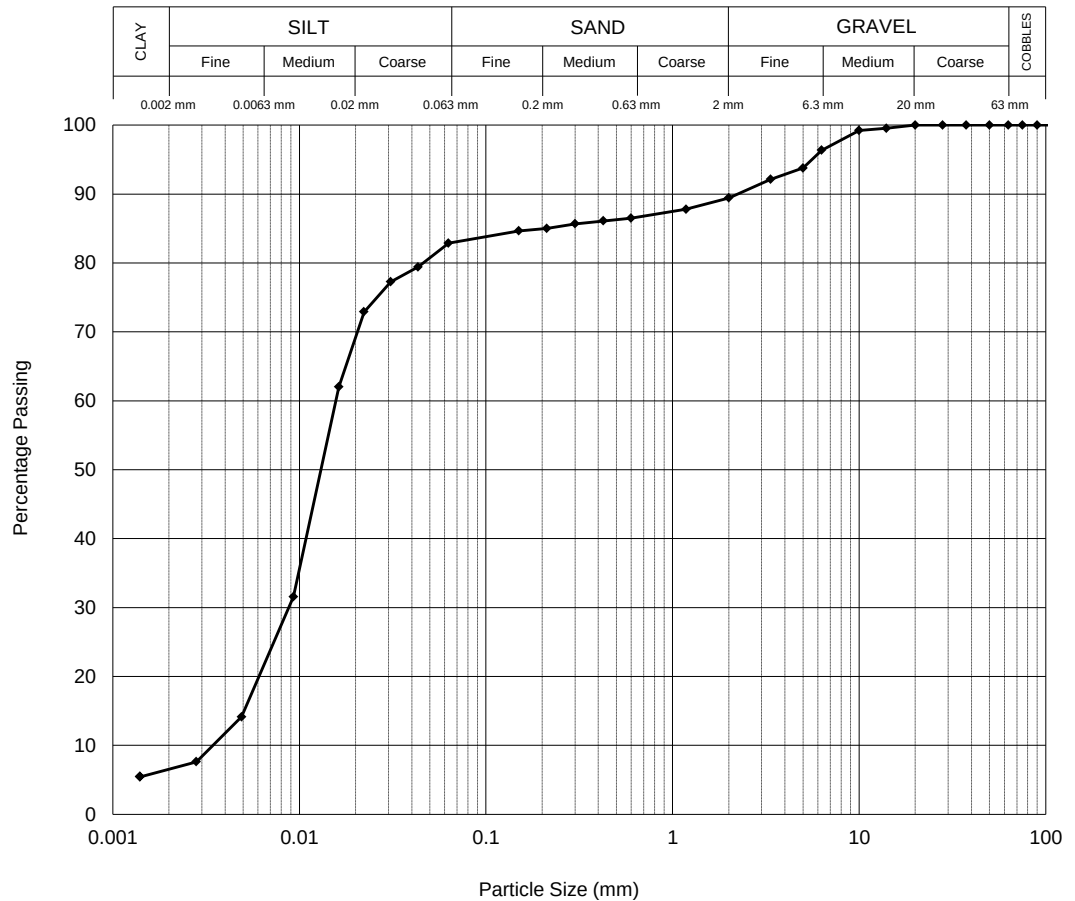
BH02
2.80-2.90
D

Description

Structureless CHALK composed of light grey sandy gravelly SILT. Gravel is medium density.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	99
6.30 mm	96
5.00 mm	94
3.35 mm	92
2.00 mm	89
1.18 mm	88
600 µm	87
425 µm	86
300 µm	86
212 µm	85
150 µm	85
63 µm	83



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
43 µm	79
31 µm	77
22 µm	73
16 µm	62
9.3 µm	32
4.9 µm	14
2.8 µm	8
1.4 µm	5

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	10.6
Sand	6.6
Silt	76.5
Clay	6.3

Tested by PK
Checked and Approved by

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J A Reynolds - Director
15/02/2023

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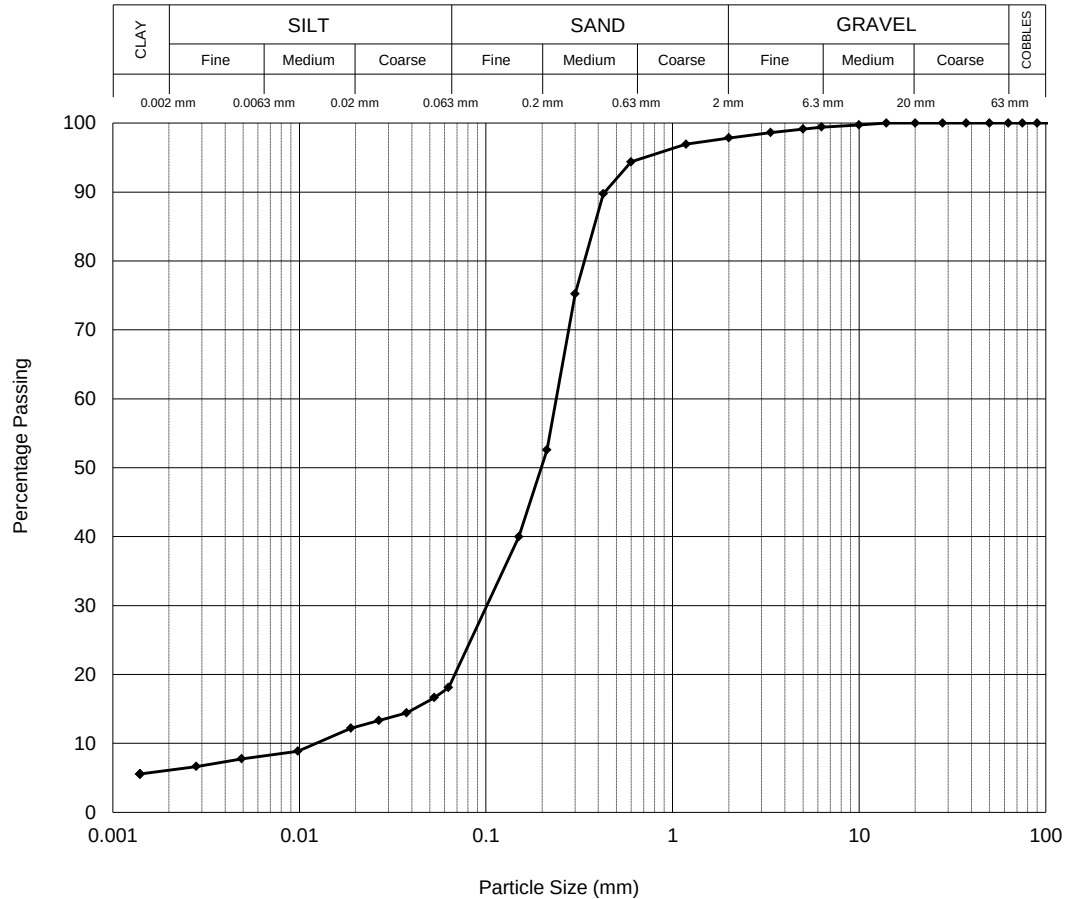
Location BH02
Depth (m) 4.20-4.67
Sample Type B

Description

Dark grey and brown mottled clayey silty SAND with rare fine to medium gravel.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.3 - Sedimentation by Hydrometer

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	99
5.00 mm	99
3.35 mm	99
2.00 mm	98
1.18 mm	97
600 µm	94
425 µm	90
300 µm	75
212 µm	53
150 µm	40
63 µm	18



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.8
Size	% Pass
53 µm	17
38 µm	14
27 µm	13
19 µm	12
9.8 µm	9
4.9 µm	8
2.8 µm	7
1.4 µm	6

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	2.1
Sand	79.8
Silt	12.1
Clay	6.0

Tested by PK
Checked and Approved by

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J A Reynolds - Director
15/02/2023

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PARTICLE SIZE DISTRIBUTION

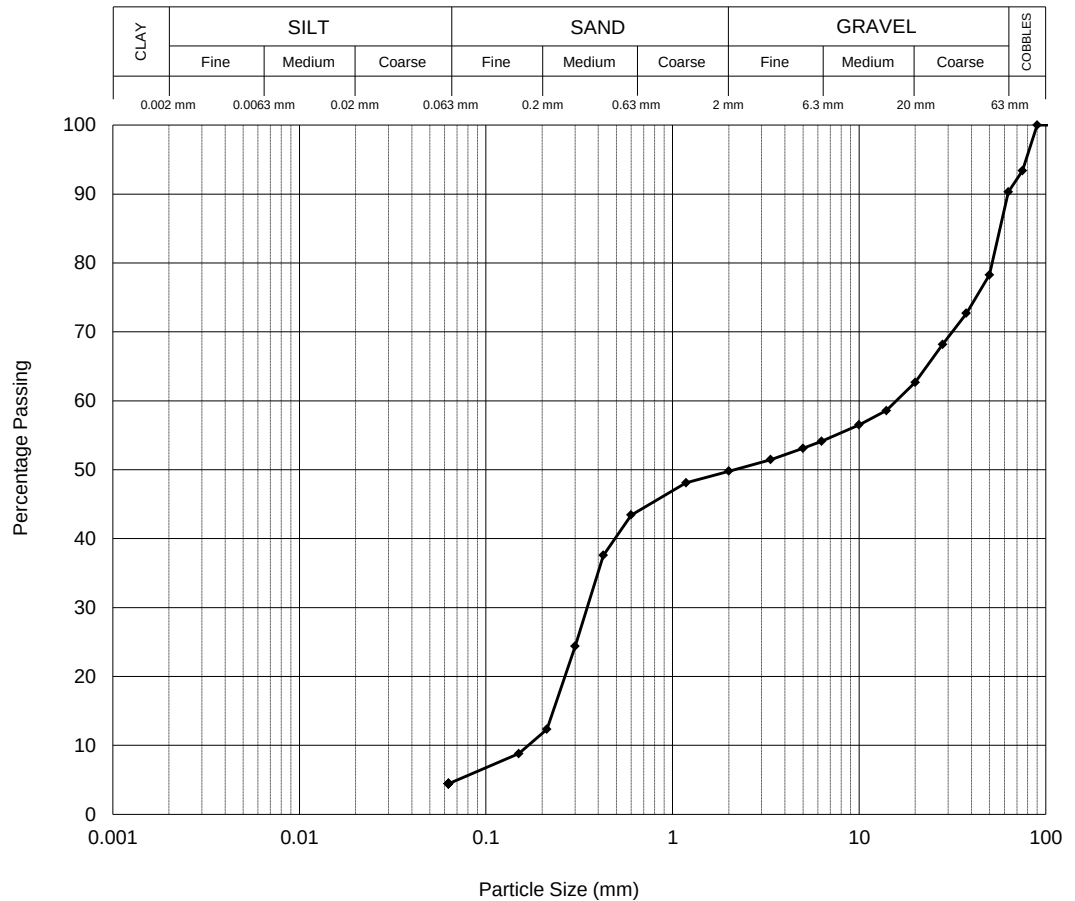
Location BH02
 Depth (m) 4.67-6.20
 Sample Type B

Description

Greyish brown mottled dark grey slightly clayey SAND with much fine to coarse gravel and two cobbles.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	93
63.0 mm	90
50.0 mm	78
37.5 mm	73
28.0 mm	68
20.0 mm	63
14.0 mm	59
10.0 mm	57
6.30 mm	54
5.00 mm	53
3.35 mm	51
2.00 mm	50
1.18 mm	48
600 µm	43
425 µm	38
300 µm	24
212 µm	12
150 µm	9
63 µm	4



Particle Proportions	
Cobbles	9.7
Gravel	40.5
Sand	45.4
Silt & Clay	4.4

Tested by PK
 Checked and Approved by

J A Reynolds

J A Reynolds - Director
 15/02/2023

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Sample details						Density		Uniaxial Compression Test (LF0879C (1000kN) compression frame used)							
Borehole Ref.	Sample Ref.	Depth (m)	Description	MC (%)	Degree of Saturation (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Mean after prep.		H/D Ratio	Load at Failure (kN)	UCS (MPa) 3 sig. fig.	Failure Sketch	D. Tested	Remarks
								Diameter (mm)	Height (mm)						
BH01		24.70-24.89	Very strong thinly laminated dark grey SILTSTONE. Fresh	1.3	40.3	2.69	2.66	89.90	153.10	1.7	711.2	112		14/02/23	Sample tested short as per clients instructions. The strength on short samples is normally higher than expected.
BH01		25.60-26.00	Strong to Very strong thinly laminated light grey SILTSTONE. Fresh	4.4	57.3	2.47	2.37	89.90	238.90	2.7	378.8	59.7		14/02/23	

Note: The dimensional requirements of flatness (<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightness (0.3 mm deviation) are all met. Specific Gravity used for Degree of Saturation is assumed unless specified by the client.

Checked and Approved by  C Clergeaud (Snr. Geologist) Date: 15/02/2023	Project Number: GEO / 37345 Project Name: WHITBROOK-HANSON STREET 404.V09695.00001	 
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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH01
 Sample Ref.: -
 Depth (m): 24.70-24.89

Description:
 Very strong thinly laminated dark grey SILTSTONE. Fresh

Diameter
Height
Bulk Density
Dry Density
Water Content

89.90 mm
153.10 mm
2.69 Mg/m ³
2.66 Mg/m ³
1.3 %

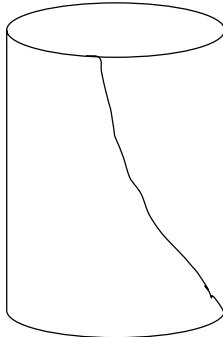
Degree of Saturation: 40.3 %

Specific Gravity: 2.9 Mg/m³ (Assumed)**Test results**

Unconfined Compressive Strength Maximum load (kN): 711.20
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

112 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used

Failure Sketch Mode of failure: Diagonal shearing

Solid lines for material failures. Dashed lines for apparent weakness failure.
Angle of foliation/Axis of loading: n/a Angle of shear plane/Axis of loading: n/a
Sample type
C

Date tested: 14/02/2023

Remarks: Sample tested short as per clients instructions. The strength on short samples is normally higher than expected.

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are all met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 15/02/2023

Project Number:

GEO / 37345

Project Name:

WHITBROOK-HANSON STREET
404.V09695.00001

GEOLABS®

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH01
 Sample Ref.: -
 Depth (m): 25.60-26.00

Description:
 Strong to Very strong thinly laminated light grey SILTSTONE. Fresh

Diameter
Height
Bulk Density
Dry Density
Water Content

Degree of Saturation: 57.3 %

Specific Gravity: 2.9 Mg/m³ (Assumed)

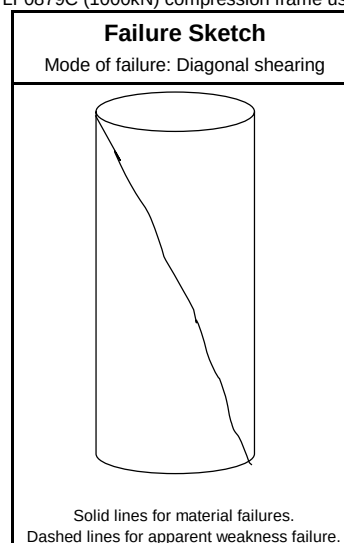
89.90 mm
238.90 mm
2.47 Mg/m ³
2.37 Mg/m ³
4.4 %

Test results

Unconfined Compressive Strength Maximum load (kN): 378.80
Young's Modulus (tangential at 50% failure load)
Poisson's Ratio (tangential at 50% failure load)
Young's Modulus (secant at 10% failure load)
Poisson's Ratio (secant at 10% failure load)

59.7 MPa
n/a
n/a
n/a
n/a

LF0879C (1000kN) compression frame used



Date tested: 14/02/2023

Angle of foliation/Axis of loading: n/a
 Angle of shear plane/Axis of loading: n/a

Sample type	C
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Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are all met.

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 15/02/2023

Project Number:

GEO / 37345

Project Name:

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